MODERN SUPERABSORBENT POLYMER TECHNOLOGY

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ABSORBENCY AND SUPERABSORBENCY

Fredric L. Buchholz

Superabsorbent polymers are fascinating substances. The most commonly available superabsorbent polymers are hard, dry, granular powders that look much like clean, white sand or granular table sugar. Other shapes, such as microspherical powders and fine fibers, are also known. Any similarity to sand or sugar is immediately forgotten when the superabsorbent polymer is put into contact with water or water solutions. At first, the slurry of water and the particles of the hard, dry granules seems unremarkable, but gradually the superabsorbent polymer absorbs the water, turning into a soft, rubbery gel. Pads of fluffed cellulose pulp fibers will absorb about 12 g of water or other aqueous solutions per gram of dry fiber,[1] whereas superabsorbent polymers will absorb up to 1,000 g of water per gram of polymer and up to about 100 g of dilute salt solution per gram of polymer. Unlike the behavior of a soaked pad of cotton or a sponge, the superabsorbent polymer gel will not release the water when squeezed with the fingers.

The advent of superabsorbent polymers is a classic case of the substitution of materials. The principal use of superabsorbent polymers is as an absorbent for water and aqueous solutions, primarily in diapers, adult incontinence products, and feminine hygiene applications. In these applications superabsorbent materials are inexorably replacing traditional absorbent materials such as cloth, cotton, paper wadding, and batts of cellulose fiber. The substitution of superabsorbent polymers for fibrous wood pulp in disposable sanitary products has taken place gradually over a time span of about 20 years and is probably not yet complete. To explain better this process of substitution, and superabsorbents generally, the essential characteristics of the tradition-

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